NASA SCIENCE MISSION DIRECTORATE

Earth Science Division
Applied Sciences Program
Disaster Management Program Element
FY2007-2011 Plan

FINAL DRAFT

Date: 11/9/2006

Expanding and accelerating the realization of economic and societal benefits from Earth system science, information, and technology

NASA Earth Science Division - Applied Sciences Program

Disaster Management Program Element

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The Applied Sciences Program websites contain additional information about the program and this program element:

Applied Sciences Program:	http://science.hq.nasa.gov/earth-sun/applications
Disaster Management Element:	http://science.hq.nasa.gov/earth-sun/applications/theme7.htm
Project Tracking & Reporting	http://aiwg.gsfc.nasa.gov

NASA Science Mission Directorate – Applied Sciences Program

Disaster Management Program Element Plan: FY 2007 - 2011

I. Purpose and Scope

The NASA Applied Sciences Program collaborates with partner organizations to enhance the application of NASA Earth science research results to serve issues of national priority. The desired outcome is for partner organizations to use project results, such as prototypes and benchmark reports, to enable the sustained, operational use of Earth science products and enhance their decision support capabilities.

The Disaster Management Program Element is one of twelve elements in the Science Mission Directorate's Applied Sciences Program. NASA and the Applied Sciences Program collaborate with partner organizations to enable and enhance the application of NASA's Earth system science results and exploration objectives to serve national priority policy and management decision-support tools. The desired outcome is for partner organizations to use project results, such as verification, validation, prototypes and benchmark reports, to enable expanded use of NASA science products and to enhance their decision-support tools, systems, and capabilities. The results of this work supports NASA's exploration science objectives to explore the Solar System and the Universe as well as NASA's research and operations transition objectives through the improvement in natural hazard and disaster identification for preparedness, response, and mitigation.

The Disaster Management Program Element extends products derived from Earth system science results information, models, technology, and other capabilities into partners' decision support tools for disaster management issues. The Disaster Management Program Element often covers the domain of issues of concern and decision-making related to volcanoes, geology, subsidence, earthquakes, drought, wildfire, hurricanes, climate, wind, tornadoes, space weather, and flooding planning, prediction, and forecasting, but only focuses on a couple or few of these issues in any one year. The Disaster Management Program Element is designed to advance the use of products from NASA's cadre of 16 Earth observation spacecraft to improve our knowledge of Earth system processes and instrument capabilities and to extend
these benefits to society. The Disaster Management Program Element focuses on decision support tools serving the following classes of issues related to the disaster cycle:

- Preparedness – Planning how to respond to a disaster
- Mitigation – Minimizing the effects of a disaster
- Response – Minimizing the hazards created by an emergency
- Recovery – Returning the community or environment to normal

NASA partners with Federal agencies and with regional-national organizations that have disaster management responsibilities and mandates to support disaster management managers. These include Local, State, Tribal and Industry partners. Partners include the U.S. Department of Homeland Security (DHS), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), the Federal Aviation Administration (FAA), the U.S. Department of Agriculture (USDA), and the U.S. Geological Survey (USGS). The Disaster Management Program Element includes international organizations and activities provided to advance NASA national priority science to the international community, especially in the area of sustainability. Disaster Management Program Element's activities benefit and are cross-cutting with the Air Quality, Agricultural Efficiency, Aviation, Carbon Management, Coastal Management, Homeland Security, Invasive

Species, Energy Management, Ecological Forecasting, Public Health, and Water Management Program Elements.

Through the Disaster Management Program, NASA provides results that support the White House Committee on Environment and Natural Resources (CENR)/Subcommittee on Disaster Reduction (SDR), Interagency Working Group on Earth Observations (IWGEO), World Summit on Sustainable Development (WSSD) and the interagency programs on Climate Change Science and Technology (CCSP, CCTP). This Program also works through such international agencies as the World Meteorological Organization/International Global Observing System (WMO/IGOS), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Committee on Earth Observation Satellites (CEOS), and other international countries and partners.

Priority NASA Science missions for the Disaster Management Program include Terra, Aqua, Aura, th Ice, Cloud, and land Elevation Satellite (ICESat), the Quick Scatterometer (QuikSCAT), CloudSAT, National Polar-orbiting Operational Environmental Satellite System (NPOESS), NPOESS Preparatory Project (NPP), Topography Experiment (TOPEX), Shuttle Radar Topography Mission (SRTM), Tropical Rainfall Measuring Mission (TRMM), Landsat, New Millennium EO-1, Jason, and Gravity Recovery and Climate Experiment (GRACE). Sensors include the Moderate Resolution Imaging Spectroradiometer (MODIS), Atmospheric Infrared Sounder (AIRS),Advanced Microwave Scanning Radiometer – E (AMSR-E), Lightning Imaging Sensor (LIS), SeaWinds, Enhanced Thematic Mapper (ETM), Ozone Monitoring Instrument (OMI), Global Positioning Satellite (GPS) and other multispectral and visible sensor. Priority Science models include the Pennsylvania State University/National Center for Atmospheric Research Mesoscale Model (MM5), Global Climate Model (GCM), ETA, Weather Research Forecasting Model (WRF), and other NASA application models.

The project plans associated with the Disaster Management Program designate specific sensors and models and state specific partnership activities to extend NASA Science measurements, environmental data records, and geophysical parameters. This plan covers objectives, projects, and activities for FY07-11.

II. Objectives: FY2007-2011

All National Applications Program Elements are aligned to the NASA Strategic Plan and the agency's objectives as expressed in the NASA Integrated Budget and Performance Document (IBPD) and the Performance Assessment Rating Tool (PART).

Short-term Objectives (FY07)
QI - II 2007

Assess the AWIPS-II decision support system for projects of opportunity. Evaluate these areas of opportunity and work with NWS Headquarters in identifying these areas.

Proceed with WSSD projects of opportunity for Africa and other developing countries. Work with African countries and regional organizations to establish plans and methods of sharing data and information.

QIII - IV 2007

Establish TRMM to GPM applications transition/risk reduction development to support AWIPS-II decision support system, consider a Rapid Prototyping Capacity project to demonstrated the capability.

Work with NWS AWIPS-II open source software to apply NASA model or product outputs.

Establish lightning and precipitation measurements to improve severe storm, rainfall, flood, and landslide prediction through AWIPS, AHPS, and NWSRFS.

Near-term Objectives (FY07-FY10)
2008

Prepare for NPP to NPOESS transition and capabilities to support the AWIPS-II decision support systems and related models and systems.

Work with USDA Forest Service on wildfire monitoring and risk reduction going from NPP to NPOESS.

Prototype early warning system for debris flows and landslides in wildfire-impacted areas.

2009

Complete transition of NPP to NPOESS products and prepare for next generation of earth observation satellites for the next decade.

Benchmark 3 or 4 products into AWIPS-II open system environment.

Continue work on WSSD and GEOSS objectives related to sustainability. Demonstrate transition of NASA earth science results to African organizations like RECTAS or NARSS.

2010

Continue to enhance disaster management preparedness through the use of future NASA satellites.

Improve research and operations transition to NPOESS and other operation missions, such as Aquarius, IceSat and GOES.

III. Disaster Management Issues, Related Research, and Decision Support Tools

Potential Disaster Management Issues: FY07-FY11
The Disaster Management Program Element authorizes studies, working group participation, program reviews, and other endeavors to ensure the Program's overall success.

Activity: CENR Subcommittee on Disaster Reduction and related Remote Sensing and Applications Workgroup
Purpose: Guide Presidential policy on disaster management through this OSTP group of agencies
Manager: Stephen Ambrose,
NASA HQ Goals: The SDR coordinates and creates policy documents that are reviewed by agencies and signed by the OSTP CENR. For example, the first document completed this year was "Reducing Disaster Vulnerability through Science and Technology." This collaborative document identified current disaster risks and agency activities. In FY04, SDR activities are structured to work closely with the Earth Observation Summit activities and implementation plans, both nationally and internationally, as well as to improve interagency coordination of challenges facing the hazards community.

Activity: U.S. Weather Research Program (USWRP)
Purpose: NASA participates in USWRP activities, such as THORPEX. The SPoRT Center at MSFC participates in severe weather research to benefit model inputs to USWRP research activities.
Managers: John Murray (LaRC), Steve Goodman (MSFC)
Goals: Ensure NASA assets are included in program experiments under the USWRP.

Activity: Consortium for International Science Information Network (CEISIN)
Purpose: Socioeconomic DAAC and Socioeconomic Data and Applications Center (SEDAC)
Managers: Steve Ambrose
Goals: Integrate applications with socioeconomic data; Establish partnerships with humanitarian and sustainable development organizations to establish joint projects. Work with earthquake community to establish risk assessments linked to population data. Bob Chen is the CEISIN DAAC manager.

Activity: State Department Partnership, Humanitarian Information Unit
Purpose: Work with the State Department in implementing DSS for the HIU. Coordinate geospatial data inputs with the GIO.
Managers: Steve Ambrose, Rodney McKellip (SSC), Myra Bambacus (GIO)
Goals: Demonstrate NASA capabilities to improve interoperability and humanitarian support. Work with State Department, HIU, CENR, GEOSS to establish coordination for a global tsunami warning system.

Activity: Committee on Environmental Information Systems and Communications (CEISC)
Purpose: Coordinates under the OFCM policy and requirements in support of earth observations and systems, a subcommittee of the ICMSSR. Mr. Fred Branski and Michael Howland co-chairs.
Manager: Steve Ambrose
Goal: Interagency coordination of observing system requirements, new technologies, frequency management, and other issues.

Activity: Earthscope and GPS

Purpose: Geodetic networks provide essential information about movement of the land surface near faults and earthquake source zones. NASA, NSF and USGS work with universities and local agencies to conduct geodetic investigations using GPS and laser-ranging surveys. A dense network of continuous GPS stations has been installed in southern California in a cooperative effort by the NASA, NSF, USGS, and UC San Diego to determine the distribution of long-term crustal deformation and the spatial and temporal variations of the strain field.
Goal: Beginning in FY05 and continuing through the duration of this work, the Plate Boundary Observatory (PBO) component of NSF's Earthscope will expand geodetic networks along the US West Coast's active plate boundary.

Activity: Natural Hazards Research and Applications Center
Purpose: To include societal impacts of disaster management in the program element; This center is supported by NASA to advance the understanding of hazards' impacts on society. The Disaster Management program manager is on the advisory committee of this non-profit center.
Manager: Kathleen Tierney (University of Colorado)
Goal: To influence the disaster management community to utilize social science as a requirements input for disaster management research and applications development.

Activity: Program Planning and Disasters RoundTable
Purpose: Support interagency coordination and activities related to disaster management. Funds to support studies, reports, and other activities sponsored through the RoundTable and other organizations, especially activities related to use of Science results.
Manager: Steve Ambrose
Goal: To influence the disaster management community to utilize social science as a requirements input for disaster management research and applications development.

The following represent priority Decision Support Tools the program focuses on in the near-term.
Priority Decision Support Tools

Advanced Weather Interactive Processing System (AWIPS), Advanced Hydrologic Prediction System, NWS River Forecast System
A high-speed, technologically advanced weather processing, display, and telecommunication decision support system called the Advanced Weather Interactive Processing System (AWIPS) is the centerpiece of National Weather Service operations. AWIPS is an interactive computer system that integrates all meteorological, hydrological, satellite, and radar data into one computer workstation that forecasters use to create their daily products at some 150 Weather Forecast Offices (WFO) and River Forecast Centers (RFC). AWIPS allows forecasters the interactive capability to view, analyze, combine, and manipulate large amounts of graphical and alphanumeric weather data, such as weather, flood, air quality, and marine weather forecasts. NOAAPORT, the NOAA portal to data and information served to AWIPS and other users of meteorological, hydrological, and oceanographic data and is the communications arm to the weather community such as AHPS and NWSRFS. AWIPS utilizes a number of spacecraft products and applications that can be enhanced by NASA research and applications. When partnered with NOAA, NASA products can improve the information provided to NWS field offices. This partnership will advance data processing, archive, transmission, and display of spacecraft information for the weather forecaster. The Disaster Management Program works with NOAA to improve AWIPS' ability to incorporate more of NASA's assets into the meteorologists' decision-making processes. For example, TRMM satellite observations of lightning can improve NWS forecasts of severe weather. The NASA Short-term Prediction Research and Transition (SPoRT) Center is improving lightning detection methods and is

working with the NWS Southern Regional Headquarters to put this information into the hands of forecasters. The SPoRT facility is a central NASA center for incorporating NASA research results to the AWIPS user community. In addition to providing NASA remote sensing and modeling capabilities, NASA has a wealth of data management, data
communications, high performance computing, and complex modeling experience that may provide significant improvement to AWIPS as AWIPS develops the next generation decision support system. By providing the NOAA with NASA satellite expertise and data communications experience, NOAA can enhance the AWIPS to provide more satellite data and model outputs to the NWS field offices and users of NOAAPORT. Increases in satellite utilization with future NPOESS and NPP data, along with improved communications and data processing capabilities essential to maximizing AWIPS' usefulness will be the goal in FY05 as AWIPS continues to operate and the next generation of AWIPS gets underway. FY07 will be a year of evaluation of AWIPS as well as development of current projects focused on the NWS Southern Region, the globe through rainfall and landslide relationships, both in its current operation as well as for development of its next generation system. This program will work closely with the crosscutting applications that deal with high performance computing, systems integration, and systems communications tobetter enhance AWIPS as the system is re-developed for NWS operations.

Remote Sensing Applications Center (RSAC)
In response to demand from agency managers, who are increasingly challenged by complex problems during the fire and fuels planning and post fire restoration processes, fire research and development (R&D) has expanded programs on management of fire and fuels, predicting effects of fire, and social and community processes, while continuing to develop improved products to support fire suppression for applications. Examples of recent tools and products in response to these challenges include1: 1) A fire growth simulator for assessing wildfire growth potential and fuels treatment priorities (FARSITE); 2) A modeling framework to predict cumulative smoke impacts from forest, rangeland, and agricultural fires (Blue Sky/RAINS); 3) A multi-agency, inter-disciplinary product designed to produce geospatial data of vegetation conditions, fire fuels, risks, and ecosystem status at the national, regional, and local scales (LANDFIRE). The Disaster Management Program works with the USDA Forest Service and related agencies to enhance their decision support system for wildfire management. For example, the RSAC of the U. S. Forest Service utilizes NASA satellite observations for wildfire monitoring, mitigation, and response. Information from the RSAC is fed across the U. S. Forest Service to a number of response teams. This information is also delivered to the National Interagency Fire Center, a decision support center for national fire coordination. The decision support system used by the NIFC is FIREWISE. The FIREWISE system is a homeowner, firefighter, and education system to help prepare, mitigate, and improve a residence, business, and community against wildfires. Forest Service has developed an architecture towards applications. This illustrates this complex cycle of research, development, and application they have developed.

IV. Project and Activities

The Disaster Management Program Element conducts projects to support the program's goal and objectives. The projects fall into three types: Solicited Projects, Directed Projects, and Congressionally-Directed Acitities. The respective Project Managers and teams are responsible for developing project plans, managing the activities, and reporting issues and results. Generally, the projects involve the following activities:
Develop and nurture partnerships with appropriate coastal organizations;

Identify and assess partners' disaster management responsibilities, plans, and decision support tools and evaluate capacity of Earth science results to support the partners;
Validate & verify application of Earth science results with partners, including development of prototypes;
Cooperate with partners to document the performance and value of Earth science results relative to partners' benchmarks and to support adoption into operational use; and,
Communicate results & partners' achievements to appropriate disastrous communities and stakeholders.

A. Solicited Projects

The program selects projects through competitive, peer-reviewed solicitations, including REASoN CAN, Decision CAN, and Research Opportunities in Space and Earth Sciences (ROSES) 2005 Announcement. The program expects to solicit projects annually in FY07-11 through the ROSES announcement. The program may provide funds to projects identified through other NASA solicitations if the projects have specific ties to the program's objectives.

International, National & Regional Organizations:

Domestic
Climate Change Technology Program (CCTP):
- The Office of Science leads a CCTP task group on measurements and monitoring supported by the Disaster Management Program.
- The Climate Change Science Program (CCSP)– A joint federal program of the President's Committee on Climate Change Science and Technology Integration has issued its strategic plan to address some of the most complex questions and problems dealing with long-term global climate variability and change.
- U.S. Weather Research Program – Weather research initiative to improve weather modeling through intensive field campaigns.
- Solid Science Working Group (SESWG) – Blue-Ribbon panel produced document on solid Science and research.
- CENR Subcommittee on Disaster Reduction (and associated Working Groups) – Office of Science and Technology Policy (OSTP) subcommittee and joint effort from all Federal agencies; NASA is co-chair f the Remote Sensing Applications Working Group (RSAWG)
- Geospatial One Stop (GOS) – GIO collaboration to bring interoperability to the federal community.
- Federal Geographic Data Committee (FGDC) – NASA participates in the standards committee for Homeland Security and Geographic Information.
- Global Learning and Observations to Benefit the Environment (GLOBE) - Disaster Management played a role in the selection of the current contractor, University Corporation for Atmospheric Research (UCAR), and continues to participate in GLOBE-sponsored events and school visitations.
- Interagency Program Office (IPO) for NPOESS – This interagency office that has NASA representation is participating in assessing and validating future NPOESS instruments and science.
- Interagency Working Group on Earth Observations (IWEGO)

International

- International Global Observing System – Through the Earth Observation Summit and the World Meteorological Organization, NASA SMD contributes by providing NASA capabilities for research.
- Global Climate Observing Strategy (GCOS) – NASA participates in international meetings related to GCOS and related data management issues.
- World Summit for Sustainable Development (and 4 Working Groups) – the Disaster Management Program leads Module 3 – Disaster Management and Conflict of the type-2 partnerships under the WSSD and partners with other space agencies involved in WSSD.
- International Symposium on Remote Sensing of the Environment (ISRSE) NASA plays a lead role in the bi-annual conference.

Ad Hoc Group on Earth Observations (GEO)

Project: Development of Remote Sensing-assisted Natural and Technological Hazards Decision Support System — Solicitation

The purpose of this project is to assess the potential for Geospatial information to improve the performance of All Federal Agencies's to have a tool for obtaining information about satellites used in Improved decisions when and where remote sensing satellites are available. for All NASA applications and remote sensing where access to satellite data is essential.

Improve the utilization of NASA data sources, modeling, and systems engineering in disaster management and homeland security. Model human risk and vulnerability to hazards; develop system for rapid identification of remote sensing assets. Channels new NASA data sources into disaster management applications. Well connected with user organizations. Also linked with the WSSD projects described in this plan. Project builds on existing capabilities by stakeholders. The total amount of REASoN funds for the five-year project is $2,054,323; FY04 is $616,696.

Budget ($K)

FY07	359
FY08	359
FY09	0
FY10	0
FY11	0

Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*
Bill Graham	SSC	FY04 - FY08	University of South Carolina

Principal Investigator(s)

Earth Science Products

mission:
sensor:
products:
models:

Other Apps.

Deliverables

Description	*End Date*	*IBPD Metric #*
Evaluation Report		
Design and Implement	4/1/2005	
Verification and Validation	4/1/2006	
Benchmark Report	4/1/2007	
Project Plan	10/1/2008	

Notes:

Project: NASA Wildfire Response Research and Development, Applications and Technology Implementation — Solicitation

The purpose of this project is to assess the potential for MODIS hotspot, airborne wildfire sensing to improve the performance of USDA Forest Service's RSAC used in strategic and tactical wildfire fighting for improvements to wildfire response, migitation, preparedness.

Benchmarks the use of UAVs and NASA satellites (MODIS, ASTER, SRTM) for improved telecommunications for disaster management with potential extension to Homeland Security; Combines existing technology with new platforms and instrumentation to address decision support requirements in tactical situations; Responds to high priority research and operational needs of the USFS partner; and, Collaborates closely with the Rochester Institute of Technology (RIT), which who received a Congressionally-directed project in FY2004 and FY2005. The total amount of REASoN funds for the five-year project is $2,643,082; FY04 is $600,000.

Budget ($K)

FY07	511
FY08	511
FY09	0
FY10	0
FY11	0

Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*
Vince Ambrosia	SSC	FY04 - FY08	

Principal Investigator(s)

Earth Science Products

mission:
sensor:
products:
models:

Other Apps.

Homeland Security

Deliverables

Description	*End Date*	*IBPD Metric #*
Evaluation Report		
Design and Implement		
Verification and Validation		
Benchmark Report		
Project Plan		

Notes:

Project: Enhancing the Famine Early Warning System Network Decision Support System with NASA Earth System Science data and Modeling Results

Solicitation

The purpose of this project is to assess the potential for MODIS moisture analysis to improve the performance of USAID's FEWS used in better water management decisions for water management for sustainability.

Enhancement to the FEWS Net decision support tool used by USAID to monitor famine conditions in 28 countries. The enhancements include: 1) MODIS/ANHRR NDVI, TRMM/GPCP/CMAP preceipitation and MODIS atmopsheric humidity to estimate critical parameters for water avialability four months in advance; 2) monitoring crop condition using MODIS 250 m and Landsat 30m reflectance data

Budget ($K)

FY07	407
FY08	0
FY09	0
FY10	0
FY11	0

Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*
Rodeny McKellip	GSFC, SSC	-	NOAA, USAID, USGS, UCSB, SSAI

Principal Investigator(s)

Earth Science Products

mission:
sensor:
products:
models:

Other Apps.

Public Health, Agricultural Efficience

Deliverables

Description	*End Date*	*IBPD Metric #*
Evaluation Report		
Design and Implement	4/1/2006	
Verification and Validation		
Benchmark Report	10/1/2007	
Begin V and V	9/30/2008	
Begin V&V	10/1/2006	
Project Plan		

Notes:

Project: Enhancement of the US Drought Monitor by Integrating NASA Earth Science Data

Solicitation

The purpose of this project is to assess the potential for hydrology and land use observations, models and products to improve the performance of USGS's US Drought Monitor used in improved drought management and detection for drought management for better land use, agriculture.

This project is a combined Decisions project with Son Nieghm of JPL and Bob Verdin of USGS as Co'I's. The project uses a variety of hydrological and land use cover projects to improve the Drought Monitor project. The proposed work will assimilate hydrologic and ecologic observations from NASA Earth satellite sensors, including the Advanced Microwave Scanning Radiometer (AMSR-E), the QuikSCAT/SeaWinds Scatterometer (QSCAT), and the Moderate Resolution Imaging Spectroradiometer (MODIS), into the U.S. Drought Monitor (USDM), hosted by the National Drought Mitigation Center at the Univ. of Nebraska. The investigators will apply a systematic approach using the systems engineering process of evaluation, verification/validation, and benchmarking to achieve major improvements in national drought monitoring and early warning capabilities. NASA satellite products to be evaluated and incorporated include soil moisture,

Budget ($K)

FY07	466
FY08	466
FY09	0
FY10	0
FY11	0

Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*
Son Neighm	JPL, (lead) SSC	-	USGS, SEDAC

Principal Investigator(s)

Earth Science Products

mission:
sensor: MODIS, AMSR-E, QSCAT
products:
models:

Other Apps.

Agricultural Efficiency, Ecological Forecasting, Water Management, Energy Management

Deliverables

Description	*End Date*	*IBPD Metric #*
Evaluation Report		
Design and Implement		
Verification and Validation		
Benchmark Report		
Project Plan		

Notes:

Project: Enhancing the Livestock Early Warning System (LEWS) with NASA Earth-Sun Science data, GPS, and RANET technologies				Solicitation	
The purpose of this project is to assess the potential for Water supply and flood hazards to improve the performance of USGS's LEWS used in Food security and sustainability for Improved food security.				*Budget ($K)*	
				FY07	339
Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*	FY08	343
Gabriel Senay		FY07 - FY09	USGS	FY09	346
				FY10	
Principal Investigator(s)				FY11	
Earth Science Products	mission: *ASTER, TRMM, GPS, SRTM* sensor: products: models: *hydrologic*			*Other Apps.*	
				Eco Forecasting, Homeland Security	

Deliverables	*Description*	*End Date*	*IBPD Metric #*
	Evaluation Report	2/28/2007	
	Design and Implement		
	Verification and Validation	10/1/2008	
	Benchmark Report	10/1/2009	
	Project Plan		

Notes: Conflicts in marginal regions of the Horn of Africa are attributable to competition among pastoral communities for limited resources. Monitoring of watering holes and rivers is important for better livestock management.

Project: Enhancing NOAA AWIPS DSS by infusing NASA Research Results for Drought and Other Disaster Management

The purpose of this project is to assess the potential for Soil Moisture to improve the performance of Virginia Polytechnic Institute and State University's AWIPS/NWSRFS used in Improved evapotraspiration measurements for Drought and water manangement issues.

Budget ($K)

FY07	369
FY08	305
FY09	276
FY10	
FY11	

Project Monitor/ Center	*Other NASA Centers*	*Timeframe*	*Partners*
Yao Liang	GSFC	FY07 - FY09	Virginia Polytech, NWS, Univ of Cal.

Principal Investigator(s)

Earth Science Products

mission: *TERRA,AQUA, TRMM*
sensor: *AMSR-E*
products: *soil moisture*
models: *NOAH*

Other Apps.

Water Management

Deliverables

Description	*End Date*	*IBPD Metric #*
Evaluation Report	10/1/2007	
Design and Implement	12/1/2007	
Verification and Validation	10/1/2008	
Benchmark Report	10/1/2009	
Project Plan		

Notes:

Will use the Hydrological Integrated Data Enivronment (HIDE) developed by Virginia Polytechnic Institute

B. Directed Projects

The program supports directed projects to serve issues of critical strategic and tactical importance, including near-term opportunities with potential for high-return in developing relationships with partner organizations and where timeliness is critical to maintain.

Project: WSSD Sustainable Development for Africa — Directed Project

Purpose: Working with the International Community, partnering with projects relevant to NASA Applied Sciences Program for the advancement of NASA science for decision support. NASA has Module 3 leadership under the CEOS WSSD Type-2 partnerships leverage NASA grants to be applied to WSSD partnerships in Africa. FY07 will include continue on an inventory of NASA and Non-NASA funded projects contributing to WSSD. A webpage will be developed to allow investigators to update their project details and activities.
The WSSD project was started in FY06 with an evaluation of NASA research relevant to the African Continent. The FY07 plan will continue this evaluation with specific evaluation of African partners working with NASA, or having the potential to work with NASA. This will include continued coordination with WSSD international partners, working with wildfire emission monitoring, FEWSnet, hydrology, and other projects under this activity to support WSSD goals. A meeting is planned in March 2008 to bring African partners to the U. S. to train on NASA data and product systems.

A meeting in Cairo Egypt is planned in November 2006 to meet with African contacts and establish partnerships and plans. Work will continue with the TIGER program, CEOS, GEO, and GEOSS in areas of collaboration to forumate project that provide data, models, information, and sustainability to the African Continent. Work on this project is easily estensible to other developing countries, such as Iraq, Afghanistan, and China. All other research and application managers are invited to participate in this proposed activity.

Budget ($K)	
FY07	300
FY08	500
FY09	500
FY10	400
FY11	400

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Bruce Davis Shahid Habib	GSFC, SSC, MSFC, JPL, ARC	FY07 - FY011	SEDAC, NOAA, State Dept., HIU (cont. in Notes)

Principal Investigator(s)

Earth Science Products

mission: *SRTM, ASTER, Landsat, Terra, Aqua, QuikSCAT*
sensor: *OCO, ALI, Seawinds, MODIS*
products: *hydrology, weather, socioeconomic, wildfire*
models: *WRF, MM5*

Other Apps.

Aviation, Public Health, Agriculture, Water Management

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan	11/1/2006	
Evaluation		
Design and Implement	3/1/2007	
Verification & Validation Report	6/1/2007	
Benchmark Report (Final)	12/1/2009	
WSSD Workshop (New Orleans)	3/1/2008	

Notes:

Project:	Advance Weather Interactive Processing System (AWIPS) NEXT GENERATION	Directed Project

AWIPS is the engine running NWS Weather Forecast Office operations. AWIPS provides an efficient and effective means for forecasters to prepare and issue timely, accurate forecasts and warnings. AWIPS is an interactive computer system that integrates all meteorological, hydrological, satellite, and radar data into one computer workstation. AWIPS allows forecasters the interactive capability to view, analyze, combine, and manipulate large amounts of graphical and alphanumeric weather data. The AWIPS communication network also consists of a wide area network (WAN), i.e., a high speed data network of terrestrial communications lines. This network allows two-way, point-to-point communications among AWIPS sites for the exchange of data and products which are locally produced. The NWS is in the process of upgrading their current DSS to a newer open system called AWIPS II or AWIPS Next Generation. This system will be an open system concept with new capabilities for display, visualization, product generation, communications, and access to data. NASA will play an important role in this development.

Purpose: To apply NASA's Science results to utilize remote sensing and model development for improvements and the development of the next generation of AWIPS.

Budget ($K)

FY07	400
FY08	800
FY09	700
FY10	200
FY11	200

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Shahid Habid Steve Goodman	GSFC, MSFC, SSC	FY07 - FY011	NOAA/NWS, NOAA/NOS, JCSDA, EPA, DHS, OFCM

Principal Investigator(s)

Earth Science Products

mission: *Terra, Aqua, QuikSCAT, TRMM, CloudSAT,*
sensor: *Seawinds, MODIS, AIRS,*
products: *Lambda Rail, HPCC, Web Map Services, Project*
models: *WRF, others*

Other Apps.

Aviation, Public Health, Agriculture, Water Management, Coastal Management, Air Quality

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan	11/1/2006	
Evaluation	6/30/2007	6ASP06.A
Design & Implementation	3/31/2008	
Verification & Validation	9/30/2009	6ASP06.A
Benchmark Report	9/30/2010	

Notes: AWIPS-II is a systems engineered decision support system that uses a variety of satellite and insitu data to create observations and forecasts for the nations weather and all hazards watches and warnings.

Goals: Validate improvements of NASA remote sensing technologies, such as LIS, OCO, SeaWinds, CloudSat to the AWIPS II DSS. Include advances in high performance computing, telecommuications, networking, web services, geospatial data, and geoscience into the AWIPS-II system. Work in the context of the AWIPS-II open systems concept to demonstrate 3 or 4 product deliverables that have been E, V&V, and B towards a solution for the next generation of AWIPS.

Partners with Cross Cutting Solutions, Water Management, Air Quality, and Aviation as contributions to AWIPS. Identify the first opportunties for advancement of AWIPS enhancements during this first year. Implement one or two of the potential enhancements in the second year. Begin two more enhancements in the second year (FY08), and benchmark in the third year (FY09).

Evaluate the ability to prepare Rapid Prototyping Capability for OCO and GPM.

Develop a visiting scientist program with AWIPS/NWS

Strong Partnership with NOAA/NWS, NOAA/NESDIS. Parallel projects with AWIPS Next Generation development plans.. Continue to work with current AWIPS system where development could carry over to next generation.

AWIPS-II Next Generation is a multi center, multi-task, and multi systems engineering activity that will help enhance the next generation of AWIPS. AWIP-II is a large multi center decision support application that can utilize NASA research results in a number of ways. This include computing, modeling, data, applications, geoscience, interactive processing, and a variety of NASA research results in hydrology, fire weather, air quality, hurricane/severe storm, earthquake, drought, and risk assessment.

C. Congressionally-Directed Activities

The program oversees Congressionally-directed activities associated with disaster management issues. The project teams for Congressionally-directed activities are responsible for developing, managing, and reporting on technically-credible and appropriately-budgeted projects aligned with the NASA Applied Sciences Program objectives. The Disaster Management program team interacts with the recipients to align their activities appropriately and facilitates interaction with the program's partners and other investigators.

Project: MRC-IDQ - Integrating Climatic and Fuels Information into National Fire Risk DST — Congressionally Mandated

Mississippi Research Consortium project. This study concentrates on integration o fnewly developed models that identify areas of potential fire risk with existing WFAS momodels used by the Fire Science Laboratory of the USDA Forest Service. The new fuels estimates are based on hierarchical modeling integration of LiDAR and multispectral reflectance data. The Forest Inventory and Analysis Southern Research Station has agreed to assist in the validation of fuel estimates through comparison of satellite based estimates with data obtained from their field plots.

Budget ($K)	
FY07	291.5
FY08	130.7
FY09	422
FY10	0
FY11	0

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Mark Glorioso	SSC	FY07 - FY09	MSU

Principal Investigator(s)

Earth Science Products

mission: *LiDAR, EO-1*
sensor:
products: *drought, fire emission, fire risk*
models: *WRF*

Other Apps.

Ecological Forecasting, Agricultural Efficiency, Homeland Security

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan		
Evaluation Report		
Design & Implementation		
Verification & Validation		
Benchmark Report		
Assessment & Prototype		
Final report (draft)		
Final report (incl. partner comments)		

Notes: Activities performed through Rapid Prototyping Center. Follow-on activities determined by results from RPC efforts.

V. Program Management & Crosscutting Solutions Support

A. Program Management Activities

The Disaster Management program conducts activities that contribute to the overall management, advocacy, and success of the program. Activities include studies and assessments in informal planning, interagency working group participation, publications and journal articles, support for conferences and workshops, program team meetings, and other related endeavors.

Project: OSTP Subcommittee on Disaster Reduction — Project Management

The SDR is an interagency group. The Subcommittee on Disaster Reduction (SDR) is an element of the President's National Science and Technology Council and facilitates national strategies for reducing disaster risks and losses that are based on effective use of science and technology. Mitigating natural and technological disasters requires a solid understanding of science and technology, rapid implementation of research information into disaster reduction programs and applications, and efficient access to diverse information available from both public and private entities. Chartered in 1988, the SDR provides a unique federal forum for information sharing; development of collaborative opportunities; formulation of science- and technology-based guidance for policy makers; and dialogue with the U.S. policy community to advance informed strategies for managing disaster risks.

Budget ($K)

FY07	35
FY08	45
FY09	45
FY10	50
FY11	50

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Stephen Ambrose	GSFC, SSC, MSFC, Ames, JPL, LaRC	FY07 - FY11	All Federal Agencies

Principal Investigator(s)

Other Apps.

Earth Science Products

mission: *all missions*
sensor: *all sensors*
products: *Implementation Plans for Disaster Reduction.*
models: *all models*

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan		
Evaluation Report		
Design & Implementation		
Verification & Validation		
Benchmark Report		
Grand Challenges Implementation	11/1/2006	
IEOS Earth Observation Plan	1/1/2007	

Notes: The SDR is expected to deliver a number of policy documents valuable to NASA. These include the 14 implementation plans for the Grand Challenges, an Integrated Earth Observation plan, and other GEO documents and opportunities. NASA is represented on US GEO and has a seat at the table.

Project: National Academies Disasters Roundtable — Project Management

Disasters Roundtable - The Disasters Roundtable's mission is to facilitate and enhance communication and the exchange of ideas among scientists, practitioners, and policy makers in order to identify urgent and important issues related to the understanding and mitigation of natural, technological, and other disasters. Disasters Roundtable workshops are held three times a year in Washington, DC. Each workshop is focused on a specific topic or issue.

Budget ($K)

FY07	35
FY08	45
FY09	80
FY10	300
FY11	435

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Stephen Ambrose	All NASA Centers	FY07 - FY11	All Federal Agencies

Principal Investigator(s)

Earth Science Products

mission: *all missions*
sensor: *all sensors*
products: *many products*
models: *many models*

Other Apps.

All 11 applications benefit from this Roundtable

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan		
Evaluation Report		
Design & Implementation		
Verification & Validation		
Benchmark Report		
Decision Support Roundtable	12/1/2007	

Notes: The Disasters Roundtable has been very responsive to the needs of NASA. Hosted under the National Academies, the Roundtable brings together experts in a public forum to discuss Disaster Management issues. These include Wildfire, Flood, Public Health, Risk Reduction, and Technological Disasters. The Roundtable will be asked this year to host a meeting related to Decision Support Systems and Disaster Management. As a steering committee member, the Disaster Management Program Manager will help sponsor such a meeting.

Project: Natural Hazards Research and Applications Information Center (NHRAIC) — Project Management

The mission of the Natural Hazards Center at the University of Colorado at Boulder, funded by NSF and partner agencies, is to advance and communicate knowledge on hazards mitigation and disaster preparedness, response, and recovery. Using an all-hazards and interdisciplinary framework, the Center fosters information sharing and integration of activities among researchers, practitioners, and policy makers from around the world; supports and conducts research; and provides educational opportunities for the next generation of hazards scholars and professionals.

Budget ($K)

FY07	35
FY08	40
FY09	45
FY10	100
FY11	100

Project Manager and Center	*Other NASA Centers*	*Timeframe*	*Partners*
Stephen Ambrose	All NASA Centers	FY07 - FY11	All Federal Agencies and Universities

Principal Investigator(s)

Earth Science Products

mission: *all missions*
sensor: *all sensors*
products: *many products*
models: *many models*

Deliverables

Description	*End Date*	*IBPD Metric #*
Project Plan		
Evaluation Report		
Design & Implementation		
Verification & Validation		
Benchmark Report		
Annual Meeting Session on NASA	7/18/2007	

Other Apps.

All 11 national applications benefit from this support.

Notes:

At the annual meeting of the Hazards Center in July 2007 NASA will host an applied science and society session.

B. Crosscutting Solutions Support

The program consists of functional elements that contribute to all of the National Applications activities. The intention is to have the performance of these functions leverage accomplishments, and therefore the apparent resource investment, to the greatest extent possible into the National Applications partnerships. These functions are: Geoscience Standards and Interoperability, Human Capital Development, Integrated Benchmark Systems, and Solutions Networks. Examples of leveraged activities are:

Integrated Benchmark Solutions

• A Rapid Prototyping Center is a proposed center at Stennis to support NASA and partners in testing and verification of Earth science results in decision support tools.

• Transition from Research to Operations Network (R2O) is a network that focuses on systematically transitioning the results of research to operational uses.

FY07: Utilize RPC for development of AWIPS-II project where support is either to weather, wildfire, or drought

FY08: Partner with Decisions 05 recipient in evaluation of hydrology inputs to AWIPS

FY09: Develop AWIPS integrated observation plan where preparations for NPP and NPOESS are considered

FY10: Implement AWIPS integrated observation project for weather/flood or drought

FY11:

Solutions Networks

Solutions Networks has the capability to discover candidate configurations of NASA research results with the potential to improve partner's decision support systems. The importance of developing a network solution for AWIPS is critical for the Next Generation of AWIPS. In collaboration with Forest Service, NOAA/NWS, and NASA, a comprehensive plan for a network solution for wildfire, drought, and flood products are needed to support wildfire, flood and drought forecasting and decision making.

DEVELOP

DEVELOP is a student-based program for rapidly prototyping solutions for state and local applications and helping students develop capabilities related to Earth science. Earth Science Gateway is a "portal of portals" providing an access point through an Internet interface to all web-enabled NASA research results.

FY07: Evaluate meteorological inputs to AWIPS hurricane/severe storm forecasts.

FY08: Evaluate interactive product for weather support to AWIPS and/or NESDIS interactive processing.

FY10: V&V/Benchmark results to NOAA customer

GIO

Earth Science Gateway is a "portal of portals" providing an access point through an Internet interface to all web-enabled NASA research results

FY07: Evaluation of GIO inputs to the Next Generation AWIPS

FY08: V&V of GIO inputs to Next Generation AWIPS, such as Web Map Services, Earth Science Gateway

FY09: RPC project related to AWIPS where inputs from NASA satellite data and research are incorporated into

FY10: Delivery of NASA research results in geoscience and geospatial data into AWIPS

FY11:

VI. Budget: FY07-11

The following table lists the DisasterManagement Program budget for FY2007 - FY2011:

Project	FY07 ($K)	FY08 ($K)	FY09 ($K)	FY10 ($K)	FY11 ($K)
Development of Remote Sensing-assisted Natural and Technological Hazards Decision Support System	359	359	0	0	0
NASA Wildfire Response Research and Development, ApFY04plications and Technology Implementation	511	511	0	0	0
Enhancing the Famine Early Warning System Network Decision Support System with NASA Earth System Science data and Modeling Results	407	0	0	0	0
Enhancement of the US Drought Monitor by Integrating NASA Earth Science Data	466	466	0	0	0
Enhancing the Livestock Early Warning System (LEWS) with NASA Earth Sun Science data, GPS, and RANET technologies	339	343	346		
Enhancing NOAA AWIPS DSS by infusing NASA Research Results for Drought and Other Disaster Management	369	305	276		
WSSD Sustainable Development for Africa	300	500	500	400	400
Advance Weather Interactive Processing System (AWIPS) NEXT GENERATION	400	800	700	200	200
MRC-IDQ - Integrating Climatic and Fuels Information into National Fire Risk DST	291.5	130.7	422	0	0
OSTP Subcommittee on Disaster Reduction	35	45	45	50	50
National Academies Disasters Roundtable	35	45	80	300	435
Natural Hazards Research and Applications Information Center (NHRAIC)	35	40	45	100	100
Total = $	**3547.5**	**3544.7**	**2414**	**1050**	**1185**

VII. Schedule and Milestones for Disaster Management

Project	*Start Date*	*Deliverable*	*End Date*
Development of Remote Sensing-assisted Natural and Technological Hazards Decision Support System	FY04	Evaluation Report	
		Design & Implementation	4/1/2005
		Verification & Validation	4/1/2006
		Benchmark Report	4/1/2007
		Project Plan	10/1/2008

Project	*Start Date*	*Deliverable*	*End Date*
NASA Wildfire Response Research and Development, ApFY04plications and Technology Implementation	FY04	Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Project Plan	

Project	*Start Date*	*Deliverable*	*End Date*
Enhancing the Famine Early Warning System Network Decision Support System with NASA Earth System Science data and Modeling Results		Evaluation Report	
		Design and Implement	4/1/2006
		Verification and Validation	
		Benchmark Report	10/1/2007
		Begin V and V	9/30/2008
		Begin V&V	10/1/2006
		Project Plan	

Project	*Start Date*	*Deliverable*	*End Date*
Enhancement of the US Drought Monitor by Integrating NASA Earth Science Data		Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Project Plan	

Project	*Start Date*	*Deliverable*	*End Date*
Enhancing the Livestock Early Warning System (LEWS) with NASA Earth Sun Science data, GPS, and RANET technologies	FY07	Evaluation Report	2/28/2007
		Design & Implementation	
		Verification & Validation	10/1/2008
		Benchmark Report	10/1/2009
		Project Plan	

Project	*Start Date*	*Deliverable*	*End Date*
Enhancing NOAA AWIPS DSS by infusing NASA Research Results for Drought and Other Disaster Management	FY07	Evaluation Report	10/1/2007
		Design & Implementation	12/1/2007
		Verification & Validation	10/1/2008
		Benchmark Report	10/1/2009
		Project Plan	

Project	*Start Date*	*Deliverable*	*End Date*
WSSD Sustainable Development for Africa	FY07	Project Plan	11/1/2006
		Evaluation	
		Design and Implementation	3/1/2007
		Verification & Validation	6/1/2007
		Benchmark Report (Final)	12/1/2009
		WSSD Workshop (New	3/1/2008

Project	*Start Date*	*Deliverable*	*End Date*
Advance Weather Interactive Processing System (AWIPS) NEXT GENERATION	FY07	Project Plan	11/1/2006
		Evaluation	6/30/2007
		Design & Implementation	3/31/2008
		Verification & Validation	9/30/2009
		Benchmark Report	9/30/2010

Project	*Start Date*	*Deliverable*	*End Date*
MRC-IDQ - Integrating Climatic and Fuels Information into National Fire Risk DST	FY07	Project Plan	
		Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Assessment & Prototype	
		Final report (draft)	
		Final report (incl. partner	

Project	*Start Date*	*Deliverable*	*End Date*
OSTP Subcommittee on Disaster Reduction	FY07	Project Plan	
		Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Grand Challenges	11/1/2006
		IEOS Earth Observation Plan	1/1/2007

Project	*Start Date*	*Deliverable*	*End Date*
National Academies Disasters Roundtable	FY07	Project Plan	
		Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Decision Support Roundtable	12/1/2007

Project	*Start Date*	*Deliverable*	*End Date*
Natural Hazards Research and Applications Information Center (NHRAIC)	FY07	Project Plan	
		Evaluation Report	
		Design & Implementation	
		Verification & Validation	
		Benchmark Report	
		Annual Meeting Session on	7/18/2007

VIII. Program Measures

The Disaster Management team uses performance measures to track progress, to identify issues, to evaluate projects, to make adjustments, and to establish results of the program element. These measures serve as condition indicators to help monitor progress within and across specific project activities to ensure that the Program meets its goals and objectives. The management team continually analyzes these measures, tracking conditions and identifying issues to keep the Program aligned with this Plan to meet its objectives.

The Program uses two performance measures: Program Management measures assess activities within the program, and Performance measures assess whether external program activities are serving their intended purpose. The Applied Sciences Program also uses this information in preparing IBPD directions and U.S. Office of Management and Budget (OMB) Program Assessment Rating Tool (PART) responses.

Program Management Measures (Internally-focused):

Inputs:
1) Potential issues and DST identified for Disaster Management – number, type, range
2) Eligible partners to collaborate with – number, type, range
3) Potential results/products identified to serve Disaster Management – number, type, range
The Disaster Management Program Element will implement steps to populate the Federal Enterprise Architecture Tool (Metis) with all relevant element information.

Outputs:
1) Assessments or evaluations of DST – number, range
2) Assessments of Earth System Science results/products to serve DST – number, range
3) Agreements with partners – presence
4) Reports (evaluation, validation, and benchmarks) – number, type

Quality and Efficiency:
1) Earth System Science results/products – number used per DST, ratio of utilized to potential
2) Agreements – ratio of agreements to committed partners
3) Reports – partner satisfaction, timeliness, time to develop
4) Reports – ratio of validations to potential products, ratio of benchmarks to validations

Performance Measures (Externally-focused):

Outcomes:
1) Science products adopted in DSTs – number, type, range; use in DST over time
2) Science products in use – ratio of products used by partners to reports produced
3) Partner and DST performance – change in partner DST performance, number and type of public recognition of use and value of Science data in DST

Impacts:
1) Partner value – change in partner metrics (improvements in value of partner decisions)

In ad□
□
programmatic benchmarks, to support assessments of the Applied Sciences Program (e.g., internal NASA reviews and OMB PART). Specif□
benchmarks) to evaluate its progress and achievements:

- Environmental and Societal Impacts Group at the National Center for Atmospheric Research (NCAR)
- Global Monitoring for Environment and Security (GMES)
- President's Subcommittee on Disaster Reduction (OSTP/CENR/SDR)

FY06 Performance Measures Satisfied by the Program – IBPD

This Program demonstrates that it plans to satisfy the following IBPD Performance Measures for FY2006:
Outcome Goal 1.2.1: Through 2012, benchmark the assimilation of observations (geophysical parameters, climate data records) provided from 20 of the 80 remote sensing systems deployed on 26 NASA Earth observation research satellites.

The Disaster Management Program will benchmark at least three (e.g., MODIS, SeaWinds, LIS) of the 20 remote

sensing sys
REASoN, and other projects and moved into operational use through Science tools, models, products, and data.

Outcome:
Goal
of 22 NASA Earth system science models.

Goal 5ESA6: Crosscutting Solutions: Benchmark solutions associated with at least five decision support systems that assimilate predictions from Earth System science models developed and maintained by the Goddard Institute for Space Studies (GISS), the Geophysical Fluid Dynamics Laboratory (GFDL), NCEP, SPoRT, and the JPL Science laboratories. The Disaster Management Program currently has linkages with NASA DEVELOP, SYNERGY, and Cross cutting Solutions activities. NASA research laboratories, such as the SPoRT Center, are moving Science research results forward through direct connection with such operational entities as NOAA. The Disaster
of the user agencies, such as DHS/FEMA.

By 2009, the Disaster Management Program will benchmark solutions to one of the five 5ESA6 decision support s
science r
FEMA, USGS, and NOAA as important areas that can be addressed by Earth Systems science.

The v
well as in the strategic plans of the partner agencies.

Appendix A: Program Element Partners

A. Program Management

Disaster Management Program Manager:
Stephen Ambrose,
NASA-Headquarters

Responsibilities:
• Program development, strategy, plans, and budgets
• Program representation, advocacy, and issues to Applied Sciences Program management and beyond
• Communication of Applied Sciences Program priorities and directives to Disaster Management Program team/network
• Implementation of interagency agreements and partnerships
• Monitoring of Disaster Management Program metrics and performance evaluation
• Co-Chair of CENR/SDR/Earth Observations Working Group guides Presidential policy on disaster management through this Office of Science and Technology Policy (OSTP) group of agencies
• Represent NASA on the National Academies Disasters Roundtable - an interagency, university, and corporation group
• Represent NASA on the Natural Hazards Center Steering Committee - A social science and disaster management steering committee

Disaster Management Deputy Program Manager:
Dr. Shahid Habib, GSFC

Responsibilities:
• Leadership on project plans, development, performance, and partnership relationships
• Communication of project metrics, performance, status, and issues to Program Manager
• Leadership and communication to Disaster Management Program team and network
• Coordination between NASA Centers on Disaster Management Program activities
• Management for grants funded through GSFC and cooperative agreements
• Management of Disaster Management Program tasks at GSFC

B. Disaster Management Network & Partners

The program element maintains a network of organizations and points-of-contact associated with Disaster Management activities.

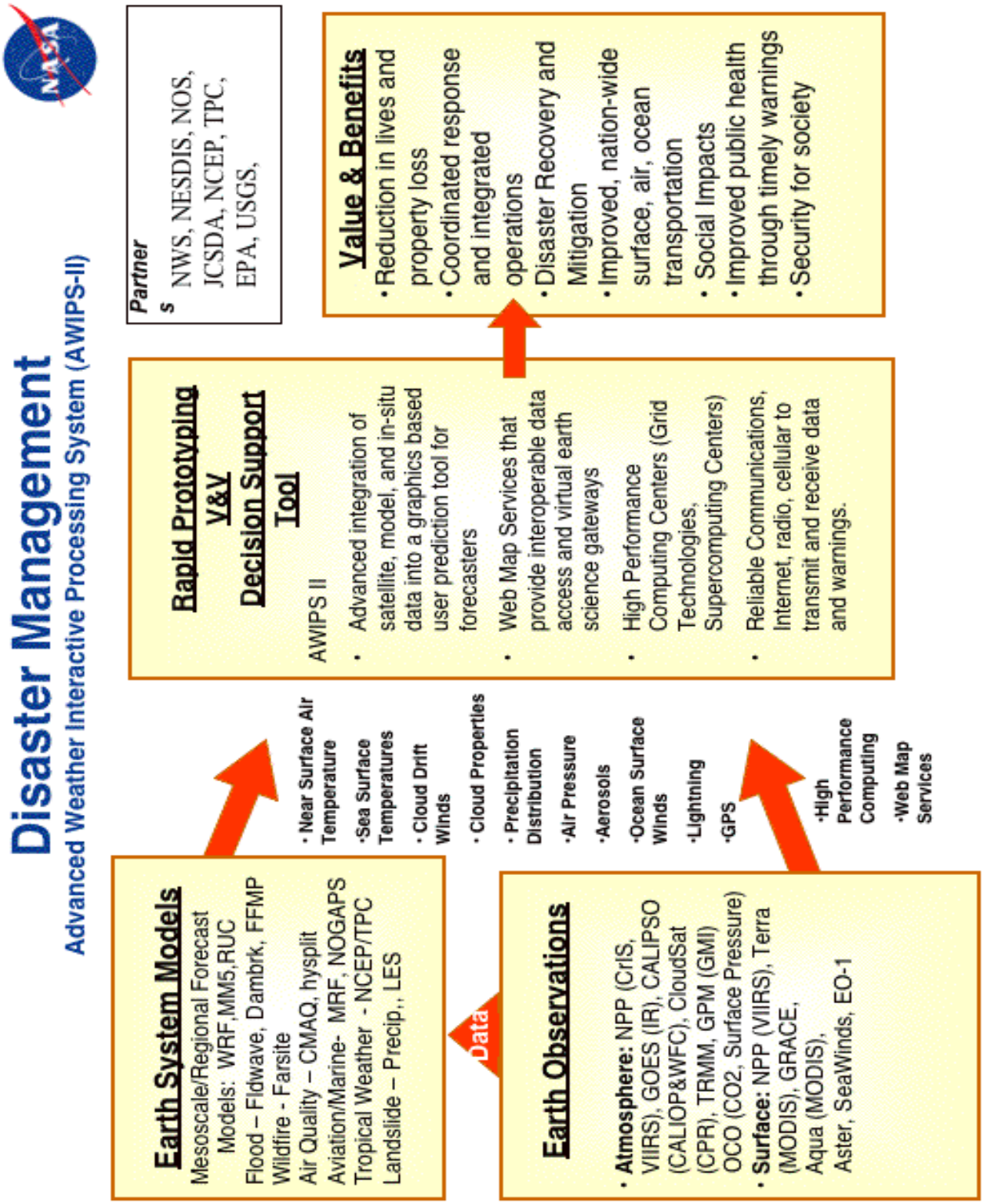
Domestic
Climate Change Technology Program (CCTP):
- The Office of Science leads a CCTP task group on measurements and monitoring supported by the Disaster Management Program.
- The Climate Change Science Program (CCSP)– A joint federal program of the President's Committee on Climate Change Science and Technology Integration has issued its strategic plan to address some of the most complex questions and problems dealing with long-term global climate variability and change.
- U.S. Weather Research Program – Weather research initiative to improve weather modeling through intensive field campaigns.
- Solid Science Working Group (SESWG) – Blue-Ribbon panel produced document on solid Science and research.
- CENR Subcommittee on Disaster Reduction (and associated Working Groups) – Office of Science and Technology Policy (OSTP) subcommittee and joint effort from all Federal agencies; NASA is co-chair of the Remote Sensing Applications Working Group (RSAWG)
- Geospatial One Stop (GOS) – GIO collaboration to bring interoperability to the federal community.
- Federal Geographic Data Committee (FGDC) – NASA participates in the standards committee for Homeland Security and Geographic Information.
- Global Learning and Observations to Benefit the Environment (GLOBE) - Disaster Management played a role in the selection of the current contractor, University Corporation for Atmospheric Research (UCAR), and continues to participate in GLOBE-sponsored events and school visitations.
- Interagency Program Office (IPO) for NPOESS – This interagency office that has NASA representation is participating in assessing and validating future NPOESS instruments and science.
- Interagency Working Group on Earth Observations (IWEGO)
- National Academies
- Hazards Center

International
- International Global Observing System – Through the Earth Observation Summit and the World
- United Nationals Educational Science, and Cultural Organization (UNESCO)
Meteorological Organization, NASA SMD contributes by providing NASA capabilities for research.
- Global Climate Observing Strategy (GCOS) – NASA participates in international meetings related to GCOS and related data management issues.
- World Summit for Sustainable Development (and 4 Working Groups) – the Disaster Management Program leads Module 3 – Disaster Management and Conflict of the type-2 partnerships under the WSSD and partners with other space agencies involved in WSSD.
- International Symposium on Remote Sensing of the Environment (ISRSE) NASA plays a lead role in the biannual conference.
- African Assocation for Remote Sensing of the Environment (AARSE).
- Regional Centre for Training in Aerospace Surveys (RECTAS)

Appendix B: Roadmaps

A. Integrated System Solutions Diagram

The figure below illustrates how Science measurements, model products, and data fusion techniques support the Disaster Management Program's partners and their decision support tools and shows the value and benefits of Science to society.



Appendix C: Acronyms

AIRS	Atmospheric Infrared Sounder
AIWG	Applications Implementation Working Group
AMSR-E	Advanced Microwave Scanning Radiometer-EOS (Japanese)
ARA	Applied Research Associates
ARC	Ames Research Center
ARGIS	ESRI GIS Software]
ARCFOREST	ESRI Based Forest Decision Support System in Canda
AWIPS	Advanced Weather Interactive Processing System
CCSP	Climate Change Science Program
CCTP	Climate Change Technology Program
CEISC	Committee on Environmental Information Systems and Communications
CEISIN	Consortium for International Science Information Network
CENR	Committee on Environment and Natural Resources
CEOS	Committee on Earth Observation Satellites
COE	Corps of Engineers
CSTARS	Center for Southeastern Tropical Remote Sensing
DEVELOP	No longer an acronym
DHS	Department of Homeland Security
DSS	Decision Support Systems
EPA	US Environmental Protection Agency
ESA	Earth Science Applications
ESG	Earth-Sun Gateway
ETA	Event Tree Analysis
ETM	Enhanced Thematic Mapper
FAA	Federal Aviation Administration
FARSITE	Forest Service Fire Decision Support System
FEA	Federal Enterprise Architecture
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FIREWISE	Forest Service Fire Decision Support System
FS	Forest Service
FY	Fiscal Year
GCM	Global Climate Model
GCOS	Global Climate Observing System
GEO	ad hoc Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GDIN	Global Disaster Information Network
GFDL	Geophysics Fluid Dynamics Laboratory
GIG	Global Information Grid
GIO	Geospatial Interoperability Office
GIS	Geographic Information System
GISS	Goddard Institute for Space Studies
GLOBE	Global Learning and Observations to Benefit the Environment
GMES	Global Monitoring for Environment and Security
GOS	Geospatial One Stop

GPM	Global Precipitation Measurement
GPS	Global Positioning System
HAZUS	Hazard- United States
HAZUS-MH	Hazard- United States - Multi-Hazard
HIU	Humanitarian Information Unit
HPCC	High Performance Computing and Communications
IAGT	Institute for Applications of Geospatial Technologies
IBPD	Integrated Budget and Performance Document
IBS	Integrated Benchmarked Systems
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
ICESat	Ice, Cloud, and Land Elevation Satellite
IGOS	Integrated Global Observations strategy
IMAAC	Interagency Modeling and Atmospheric Assessment Center
IMPLAN	Economic Input/Output model for fire cost assessment
INFORMS	Institute for Operations Research and the Management Sciences
INSAR	Interferometric Synthetic Aperture Radar
IOC	Intergovernmental Oceanographic Commission
IPO	Interagency Program Office (NPOESS)
ISRSE	International Symposium for Remote Sensing of the Environment
IWGEO	Interagency Working Group on Earth Observations
JCSDA	Joint Center for Satellite Data Assimilation
JPL	Jet Propulsion Laboratory
LANDFIRE	Land forest fire decision support system
LANDIS	Land fire probability model
LaRC	Langley Research Center
LDAS	Land Data Assimilation System
LIDAR	Light Detecting and Ranging
LIS	Lightning Imaging Sensor
MAGIS	Analytical Tool for Measuring fire extent (used with SIMPPLLE)
MIT	Massachusetts Institute of Technology
MLRRS	Modis Land Rapid Response System
MM5	Mesoscale Model
MODIS	Moderate Resolution Imaging Spectroradiometer
MOU	Memorandum of Understanding
MSFC	Marshall Space Flight Center
NASA HQ	NASA Headquarters
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NED	Northeast Decision Model
NEESPI	Northern Eurasia Earth Science Partnership Initiative
NESDIS	National Environmental Satellite Data Information Service
NIBS	National Institute for Building Sciences
NIERSC	Nansen International Environmental and Remote Sensing Center
NIFC	National Interagency Fire Center
NOAA	National Oceanic and Atmospheric Administration
NOAAPort	NOAA Data Portal for AWIPS
NPOESS	National Polar-Orbiting Operational Environmental Satellite System

NPP	NPOESS Preparatory Project/Net Primary Productivity
NRA	NASA Research Announcement
NRC	National Research Council
NSF	National Science Foundation
NWS	National Weather Service
OFCM	Office of the Federal Coordinator for Meteorology
OMB	Office of Management and Budget
OMI	Ozone Monitoring Instrument
ORA	Office of Research Applications
OSTP	Office of Science and Technology Policy
PART	Program Assessment Rating Tool
QuikSCAT	Quick Scatterometer
R&D	Research and Development
R2O	Research to Operations Network
RACNE	Regional Applications Center for the Northeast
RAINS	Rapid Assessment Information System (Forest Service)
REASoN	Research, Education, and Applications Solutions Network
RELMdss	Regional Ecosystems and Land Management (RELM). Decision Support
RFC	River Forecast Centers
RIT	Rochester Institute Technology
ROSES	Research Opportunities in Space and Earth Sciences
RSAC	Remote Sensing Applications Center
RSAWG	Remote Sensing and Applications Working Group
SAIC	Science Applications International Corporation
SAR	Synthetic Aperture Radar
SARA	Superfund Amendments Reauthorization Act
SCIGN	Southern California Integrated Global positioning system Network
SENH	Solid Earth Natural Hazards
SDR	Subcommittee on Disaster Reduction
SEA	State Enterprise Architecture
SEDAC	Socio Economic Data and Application Center
SERVIR	Regional Visualization and Monitoring System for the Mesoamerican Biological Corridor
SESWG	Solid Earth Science Working Group
SIMPPLLE	Simulating Patterns and Processes at Landscape Scales Acronym
SNAP	Special Needs Awareness Program
SPECTRUM	Analytical Tool to Support Ecosystem Management
SPoRT	Short-term Prediction Research and Transition Center
SPOT	French Satellite which Collects Information on Arousals and Ozone
SRTM	Shuttle Radar Topography Mission
SSC	Stennis Space Center
SSD	Satellite Services Division
SYNERGY	Congressionally Mandated Program
THORPEX	The Observing-System Research and Predictability Experiment
TerraVision	interactive terrain visualization system
TOPEX/POSEIDON	Satellite from JPL with Five Instruments
TRMM	Tropical Rainfall Measurement Mission

UCAR	University Corporation for Atmospheric Research
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USWRP	United States Weather Research Program
UTOOLS	Microcomputer Software for Spatial Analysis and Landscape Visualization
V&V	Verification and Validation
VIIRS	Visible/Infrared Imager/Radiometer Suite
WASP	Wildfire Airborne Sensor Program
WAVEWATCH III	Ocean Wave Model
WCDR	World Conference on Disaster Reduction
WFO	Weather Forecast Office
WMO	World Meteorological Organization
WRAP	Wildfire Research and Applications Project
WRF	Weather Research and Forecast
WSSD	World Summit on Sustainable Development
WWRP	World Weather Research Program

This document contains the Disaster Management Program Element Plan for FY 2007-2011.

NASA Science Mission Directorate
Earth Science Division - Applied Science Program
Disaster Management Program Element

This plan derives from direction established in the NASA Strategic Plan, Earth Science Enterprise and Space Science Enterprise Strategies, Earth Science Applications Plan, and OMB/OSTP guidance on research and development. The plan aligns with and serves the commitments established in the NASA Integrated Budget and Performance Document.

The Program Manager and the Applied Sciences Program Leadership have reviewed the plan and agree that the plan appropriately reflects the goals, objectives, and activities for the Program Element to serve the Applied Sciences Program, Earth Science Division, NASA, the Administration, and Society.

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